

REMARKS

Applicant appreciates the Examiner's thorough consideration provided the present application. Claims 21, 23-31, 33-36 and 38-40 are now present in the application. Claims 29 and 30 have been amended. Claims 21, 24, 27, 31 and 35 are independent. Reconsideration of this application, as amended, is respectfully requested.

Information Disclosure Citation

Applicant thanks the Examiner for considering the Chinese Office Action supplied with the Information Disclosure Statement filed on March 23, 2007.

Claim Rejections Under 35 U.S.C. § 103

Claims 21, 23, 31 and 35-38 stand rejected under 35 U.S.C. § 102(b) as unpatentable over Takashi, JP 2001-0274096, and Kaneyama, U.S. Patent No. 6,452,214. Claims 24-28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takashi in view of Koike, U.S. Patent No. 7,141,444. Claims 29, 30, 33, 34 and 40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Takashi in view of Koike, and further in view of Koide, U.S. Patent Application Publication No. US 2001/0048112. Claim 39 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Takashi and Kaneyama, and further in view of Yuasa, U.S. Patent No. 6,017,774. These rejections are respectfully traversed.

Complete discussions of the Examiner's rejections are set forth in the Office Action, and are not being repeated here.

Claims 21, 31 and 35

Independent claims 21, 31 and 35 recite a combination of elements including “the buffer layer has a triple-structured $\text{Al}_y\text{In}_x\text{Ga}_{1-(x+y)}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$ laminated (where $0 < x \leq 1$, $0 \leq y \leq 1$).” Applicant respectfully submits that the above combinations of elements set forth in claims 21, 31 and 35 are not disclosed or suggested by the references relied on by the Examiner.

The Examiner referred to the combination of Takashi’s buffer (AlGaN) layer 2, an undoped GaN layer 3, and an InGaN/AlGaN layer 30 as the buffer layer of the claimed invention. As shown in FIG. 1 and Table 1 of Takashi, this reference simply discloses that the buffer layer is AlGaN(layer 2)/GaN (layer 3)/InGaN/AlGaN (layer 30). However, Takashi fails to teach or suggest that the buffer layer has a laminated triple-structured AlInGaN/InGaN/GaN layer. Therefore, Takashi fails to teach “the buffer layer has a triple-structured $\text{Al}_y\text{In}_x\text{Ga}_{1-(x+y)}\text{N}/\text{In}_x\text{Ga}_{1-x}\text{N}/\text{GaN}$ laminated (where $0 < x \leq 1$, $0 \leq y \leq 1$)” as recited in claims 21, 31 and 35.

With regard to Kaneyama, this reference simply discloses that the buffer layer 102 is AlN (see col. 3, lines 54-55, col. 4, lines 53-55 and col. 7, lines 50-52). Kaneyama also fails to teach that the buffer layer has a laminated triple-structured AlInGaN/InGaN/GaN layer.

In addition, Kaneyama relates to an LED which eliminates disadvantages caused by the differences both in thermal expansion coefficient and in lattice constant between the p-type clad layer and p-type contact layer (see the “Summary of the Invention” section). Because Kaneyama’s buffer layer is a single-structured layer and its disclosure does not focus on the buffer layer, there is no teaching to combine Kaneyama’s buffer layer with Takashi’s triple-structured buffer layer.

Claims 24 and 27

Independent claim 24 recites a combination of elements including “ $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$ short period superlattice (SPS) layers on the buffer layer in a sandwich structure of upper and lower layers having an indium-doped GaN layer interposed therebetween (where $0 < y \leq 1$).”

Independent claim 27 recites a combination of elements including “ $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$ short period superlattice (SPS) layers on the indium-doped GaN layer, in a sandwich structure of upper and lower layers having the indium-doped GaN layer interposed therebetween (where $0 < y \leq 1$).”

Applicant respectfully submits that the above combinations of elements set forth in claims 24 and 27 are not disclosed or suggested by the references relied on by the Examiner.

The Examiner has correctly acknowledged that Takashi fails to teach $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$ short period superlattice (SPS) layers is in a sandwich structure of upper and lower layers having the indium-doped GaN layer interposed therebetween.

Koike also fails to cure the deficiencies of Takashi. In particular, Koike's GaN layer 3031 is simply formed on the buffer layer 3002. Koike nowhere discloses that GaN layer 3031 can be interposed between the $\text{Al}_y\text{Ga}_{1-y}\text{N}/\text{GaN}$ short period superlattice (SPS) layers (see col. 22, lines 54-67 and Fig 19A). In addition, there is no teaching to combine Koike's GaN layer 3031 with Takashi's SPS layer (40,50).

With regard to the Examiner's reliance on the other secondary references, these references have only been relied on for their teachings related to some dependent claims. These references also fail to disclose the above combinations of elements and steps as set forth in

independent claims 21, 24, 27, 31 and 35. Accordingly, these references fail to cure the deficiencies of Takashi.

In addition, claims 23, 25, 26, 28-30, 33, 34, 36 and 38-40 depend, either directly or indirectly, from independent claims 21, 24, 27, 31 and 35, and are therefore allowable based on their respective dependence from independent claims 21, 24, 27, 31 and 35, which are believed to be allowable.

Furthermore, dependent claim 30 further recites that the second n type GaN based layer is a semi-insulating GaN based layer. Support for the amendments to claims 30 can be found in Fig. 3 and on page 8, lines 27-35 and page 9, lines 1-4 of the specification. As disclosed on page 8, lines 27-35 and page 9, lines 1-4 of the specification, when the n-GaN layer 308 is formed with a semi-insulating GaN layer, it can also function as a role of a current prevention layer for effectively cutting off the current leakage which is, at the time of reverse bias, reversely intruded in the light emitting layer (multi-quantum well active layer). However, Koide simply discloses that the GaN layers (3a, 3b) are silicon doped, but fails to teach the GaN layers (3a, 3b) are a semi-insulating GaN based layer as recited in claim 30.

In view of the above remarks, Applicant respectfully submits that claims 21, 23-31, 33-36 and 38-40 clearly define the present invention over the references relied on by the Examiner. Accordingly, reconsideration and withdrawal of the rejections under 35 U.S.C. § 103 are respectfully requested.

Additional Cited References

Since the remaining patents cited by the Examiner have not been utilized to reject the claims, but rather to merely show the state of the art, no further comments are necessary with respect thereto.

CONCLUSION

All the stated grounds of rejection have been properly traversed and/or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider all presently pending rejections and that they be withdrawn.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

In the event there are any matters remaining in this application, the Examiner is invited to contact the undersigned at (703) 205-8000 in the Washington, D.C. area.

Application No. 10/517,818
Amendment dated February 19, 2008
Reply to Office Action of November 19, 2007

Docket No.: 3449-0413PUS1

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: February 19, 2008

Respectfully submitted,

By 

James T. Eller, Jr.

Registration No.: 39,538

BIRCH, STEWART, KOLASCH & BIRCH, LLP

8110 Gatehouse Road

Suite 100 East

P.O. Box 747

Falls Church, Virginia 22040-0747

(703) 205-8000

Attorney for Applicant

